

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

WHAT IS CLAIMED IS:

1. A method for managing a plurality of cachable entities, comprising the steps of:

analyzing program code to determine if there is at least one statement which affects a desirability of

performing at least one cache transaction; and

performing the at least one cache transaction if it is desired.

2. The method of claim 1, wherein the desirability of performing the at least one cache transaction is based on one of a frequency of access of at least one cachable entity, a size of at least one cachable entity, a time to one of fetch and materialize at least one cachable entity, a lifetime of at least one cachable entity, and a combination thereof.

3. The method of claim 1, wherein the at least one statement is a statement that modifies a value of at least one cachable entity, and wherein the desirability is based on an expected lifetime of the at least one cachable entity.

))

4. The method of claim 1, wherein the step of performing at least one cache transaction comprises one of storing at least one cachable entity in a cache, invalidating at least one cachable entity stored in a cache, 5 updating at least one cachable entity stored in a cache, and a combination thereof.

5. The method of claim 1, further comprising the step of augmenting the program code with additional code to assist in determining the desirability of performing the at 10 least one cache transaction.

6. The method of claim 1, further comprising the step of augmenting the program code with additional code to perform the at least one cache transaction.

7. The method of claim 4, wherein at least one 15 of the step of invalidating the at least one cachable entity stored in the cache and the step of updating the at least one cachable entity stored in the cache comprise the step of performing data update propagation (DUP).

))
8. The method of claim 1, wherein the at least one statement is one of source code, assembly code, machine code, and structured query language (SQL) code.

5 9. The method of claim 8, wherein the at least one statement in the SQL code includes at least one SET statement.

10. The method of claim 1, wherein the cachable entities include query results.

10 11. The method of claim 1, wherein the analyzing step comprises the steps of:

detecting at least one query statement for retrieving at least one of the cachable entities from a cache;

15 generating a query key format; and
augmenting the program code with additional code for calculating a query key in accordance with the query key format.

20 12. The method of claim 11, wherein the step of performing at least one cache transaction comprises the steps of:

))
executing the augmented code to calculate the
query key;

searching the cache using the query key; and

retrieving at least one cachable entity stored in
5 the cache if the cachable entity corresponds to the query
key.

13. The method of claim 12, further comprising
the steps of:

processing the at least one query statement to
10 retrieve at least one of the plurality of cachable entities,
if there are no cachable entities in the cache which
correspond to the query key;

storing the at least one retrieved cachable entity
in the cache using the query key; and

15 associating at least one dependency with the at
least one retrieved cachable entity.

14. The method of claim 1, wherein the at least
one statement is a type that one of creates at least one
cachable entity, deletes at least one cachable entity, and
20 modifies a value of at least one cachable entity, wherein
the analyzing step comprises the steps of:

generating an invalidation key format in
accordance with the type of the at least one statement; and

augmenting the program code with additional code
for calculating an invalidation key in accordance with the
5 generated invalidation key format.

15. The method of claim 14, wherein the step of
performing at least one cache transaction comprises the
steps of:

executing the augmented code to calculate the
10 invalidation key; and

invalidating at least one cachable entity stored
in the cache that corresponds to the invalidation key.

16. The method of claim 15, wherein the step of
invalidating at least one cachable entity comprises one of
15 purging the cachable entity from the cache, purging the
cachable entity from the cache and repopulating the cache,
and updating the cache.

17. The method of claim 1, wherein the step of
performing at least one cache transaction comprises the step
20 of initializing a cache.

))

18. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for managing a plurality of cachable entities, the method steps comprising:

analyzing program code to determine if there is at least one statement which affects a desirability of performing at least one cache transaction; and

performing the at least one cache transaction if it is desired.

19. The program storage device of claim 18, wherein the desirability of performing the at least one cache transaction is based on one of a frequency of access of at least one cachable entity, a size of at least one cachable entity, a time to one of fetch and materialize at least one cachable entity, a lifetime of at least one cachable entity, and a combination thereof.

20. The program storage device of claim 18, wherein the at least one statement is a statement that modifies a value of at least one cachable entity, and wherein the desirability is based on an expected lifetime of the at least one cachable entity.

21. The program storage device of claim 18,
wherein the instructions for performing at least one cache
transaction include instructions for one of storing at least
one cachable entity in a cache, invalidating at least one
5 cachable entity stored in a cache, updating at least one
cachable entity stored in a cache, and a combination
thereof.

22. The program storage device claim 18, further
including instructions for augmenting the program code with
10 additional code to assist in determining the desirability of
performing the at least one cache transaction.

23. The program storage device of claim 18,
further including instructions for augmenting the program
15 code with additional code to perform the at least one cache
transaction.

24. The program storage device of claim 21,
wherein the instructions for at least one of invalidating
the at least one cachable entity stored in the cache and
20 updating the at least one cachable entity stored in the

cache include instructions for performing data update propagation (DUP).

25. The program storage device of claim 18,
wherein the at least one statement is one of source code,
5 assembly code, machine code, and structured query language
(SQL) code.

26. The program storage device of claim 25,
wherein the at least one statement in the SQL code includes
at least one SET statement.

10 27. The program storage device of claim 18,
wherein the cachable entities include query results.

28. The program storage device of claim 18,
wherein the instruction for performing the analyzing step
15 include instructions for performing the steps of:

detecting at least one query statement for
retrieving at least one of the cachable entities from a
cache;

generating a query key format; and

))
augmenting the program code with additional code
for calculating a query key in accordance with the query key
format..

5 29. The program storage device of claim 28,
wherein the instructions for performing at least one cache
transaction include instructions for performing the steps
of:

 executing the augmented code to calculate the
10 query key;

 searching the cache using the query key; and
 retrieving at least one cachable entity stored in
the cache if the cachable entity corresponds to the query
key.

15 30. The program storage device of claim 29,
further including instructions for performing the steps of:

 processing the at least one query statement to
retrieve at least one of the plurality of cachable entities,
if there are no cachable entities in the cache which
20 correspond to the query key;

 storing the at least one retrieved cachable entity
in the cache using the query key; and

associating at least one dependency with the at least one retrieved cachable entity.

31. The program storage device of claim 18, wherein the at least one statement is a type that one of
5 creates at least one cachable entity, deletes at least one cachable entity, and modifies a value of at least one cachable entity, wherein the instructions for performing the analyzing step include instructions for performing the steps of:

10 generating an invalidation key format in accordance with the type of the at least one statement; and augmenting the program code with additional code for calculating an invalidation key in accordance with the generated invalidation key format.

15 32. The program storage device of claim 31, wherein the instructions for performing the at least one cache transaction include instructions for performing the steps of:

20 executing the augmented code to calculate the invalidation key; and

invalidating at least one cachable entity stored in the cache that corresponds to the invalidation key.

33. The program storage device of claim 32,
wherein the instructions for invalidating at least one
cachable entity include instructions for performing one of
purging the cachable entity from the cache, purging the
5 cachable entity from the cache and repopulating the cache,
and updating the cache.

34. The program storage device of claim 18,
wherein the instructions for performing the at least one
cache transaction include instructions for initializing a
10 cache.

35. A system for managing a plurality of cachable
entities, comprising:

a program analyzer to analyze program code and
determine if there is at least one statement which affects a
15 desirability of performing at least one cache transaction;
and

a cache manager for performing the at least one
cache transaction if it is desired.

36. The system of claim 35, wherein the
20 desirability of performing the at least one cache

transaction is based on one of a frequency of access of at least one cachable entity, a size of at least one cachable entity, a time to one of fetch and materialize at least one cachable entity, a lifetime of at least one cachable entity, and a combination thereof.

37. The system of claim 35, wherein the at least one detected statement is a statement that modifies a value of at least one cachable entity, and wherein the desirability is based on an expected lifetime of the at least one cachable entity.

38. The system of claim 35, wherein the cache manager performs one of storing at least one cachable entity in the cache, invalidating at least one cachable entity stored in the cache, updating at least one cachable entity stored in the cache, and a combination thereof.

39. The system of claim 35, wherein the cache manager augments the program code with additional code to assist in determining the desirability of performing the at least one cache transaction.

40. The system of claim 35, wherein the cache manager augments the program code with additional code to perform the at least one cache transaction.